AGRICULTURAL EXTENSION SERVICE
UNIVERSITY OF MINNESOTA

PLANT PATHOLOGY
FACT SHEET No. 33–1978
HERBERT G. JOHNSON

Apple Scab

Apple scab is a fungus disease that can be extremely severe causing loss of leaves, reduced yield, and inedible fruit. In Minnesota and many other areas, it is the most common and persistent disease of apples. Control measures must be applied if commercial quality fruit is to be produced; however, many people are willing to use home-grown apples despite some scab. Isolated apple trees sometimes escape scab infection for many years.

DESCRIPTION

Apple scab is most common as spots on leaves (figures 1 and 2). These spots usually appear light brown and later become black. In early stages the spots appear as small smudges of soot, but later, they become more distinct and have well defined margins. A leaf with several spots will later turn yellow and drop. Infected fruit has distinct brown or black spots with margins that are often irregular. When severe, the skin splits open and irregularly shaped fruit results (figure 3).

Figure 1. Scab infection on terminal leaves.

Figure 2. Light and severe scab infection on individual leaves.

CAUSE

The fungus which causes apple scab is called *Venturia inaequalis*. The term *inaequalis* was selected as descriptive of the summer spores that are large on one end and small on the other. This fungus lives only on apple trees. During the late spring, summer, and early fall, it continually produces spores which cause new infections. The leaves drop in the fall, and the fungus overwinters in the leaves. The next spring a different type of spore is produced on the fallen leaves and these become active during the first few weeks of the apple trees' growth. The cycle is then complete and the scab fungus continues making new infections throughout the summer.

DAMAGE

Infections by the fungus occur on leaves, fruit, and a few small young twigs. Leaf damage is related to the density of spotting. Leaves can stand a few spots, but if a high percentage of leaf surface is covered with spots, leaves turn yellow, die, and drop. The severity of fruit damage is determined by the number of spots. A single spot will eliminate an apple from top grade marketing. Additional spots make the fruit less attractive and as spots increase the fruit size shrivels, deep cracks are formed in the skin, and the fruit becomes inedible. If scab is severe for several successive years tree vigor is seriously reduced. Fruit production is at first reduced and eventually stops, and the tree may die primarily from severe scab.

Figure 3. Severe scab on apple fruit.

WEATHER EFFECTS

Most fungi which cause leaf diseases require several hours of free water on leaf surfaces for germination of spores and penetration of leaf surface by the growing fungus. Apple scab is very typical of such diseases. The relationship between temperature and the number of hours of continuous wet sur-

face required for primary apple scab infection has been well worked out. It ranges from about 48 hours at 32° to 40°F to 9 hours at 58° to 76°F. Above 76°F more time is needed. Periods of wet weather in the orchard during the growing season are favorable for scab infection; the longer the wet periods, the more resulting infection.

CONTROL OF SCAB

- Resistant apple cultivars (cultivated varieties) would be desirable and there are some differences in susceptibility to scab among types of apples, but most cultivars are susceptible to this disease. Prima and Priscilla are relatively new cultivars which are scab resistant.
- Proper pruning of trees serves two purposes in scab control. An open tree has good ventilation which hastens drying and in that way reduces the number of infections. The open tree can be sprayed effectively in terms of good coverage of leaf and fruit surfaces.
- The removal or destruction of the overwintering scab fungus in apple leaves has been recommended and practiced in many areas for a long time. Leaves have been collected in the orchard and hauled away. But this practice is of little value if a good fungicide program is used early in the season. Calculations indicate that if only 1 percent of the fungus fruiting bodies escape removal, with the right weather conditions, this is enough to start a severe infection.
- Fungicide sprays—the only reliable means of controlling scab is by use of proper fungicides, thoroughly applied, and on a good schedule. The following fungicides (table below) are effective for scab control and when this was written were registered for use on apple trees. Follow label directions for details of fungicide use.

Application should be on a flexible schedule depending on weather, disease experience of previous years, and the degree of control desired. A minimum schedule for average conditions would include applications at the following times: pink stage, petal fall, and every 2 weeks through August. This would not be adequate for commercial apples where high quality fruit is required. Applications at 5-7 day intervals are necessary during extended wet periods to prevent infection. Fungicides and insecticides are combined in most spray applications.

The pesticide residues can be removed by dry rubbing or washing the fruit.

Extension Folder 375: Home Fruit Spray Guide has additional information for small plantings, and Special Report 6: Commercial Fruit Spray Guide has additional information for commercial growers.

Fungicide common name	Some trade names	Amount formulation[2] per 100 gallons	per gallon
For scab control only[1]			
benomyl[3]	Benlate 50WP	2-6 oz.	¼-½ t.
captan	Captan 50WP, Orthocide 50WP	1½-2 lb.	1¼-1½ T.
dodine	Cyprex 65WP	¼-½ lb.	½-1 t.
folpet	Folpet 50WP, Phaltan 50WP	1-2 lb.	1-2 T.
	Glyodin	1 qt.	2 t.
For scab and rust control[1]			
mancozeb	Dithane M-45 80WP Manzate 200 80WP	1-2 lb.	½-1 T.
maneb + zinc	Dithane M-22 Special 80WP Manzate D 80WP	1½-2 lb.	½-1 T.
metiram	Polyram 80WP	2 lb.	1 T.
thiram	Thylate 65WP	1½-2 lb.	1¼-1½ T.

[1] Usually, the fungicides listed "for scab control only" are the most effective. Those "for scab and rust control" are needed if rust is a problem, and for home orchard use they usually give satisfactory scab control.

[2] Formulation is the trade name material.
T is level tablespoon
t is level teaspoon
WP is wettable powder

[3] Benomyl should always be used in combination with one of the other fungicides to help avoid the development of strains of the scab fungus that are resistant to benomyl. A typical mixture is 2-3 oz. Benlate and 1 lb. of Dithane M-45, Manzate 200, Dithane M-22 Special, Manzate D, or Polyram per 100 gallons of dilute spray.